

AMENDMENTS TO THE SPECIFICATION

In the Brief Description of the Drawings, please add the following paragraphs, after page 6, line 7 of the specification as filed on November 20, 2010: Support for the new drawings comes from U.S. Prov. Pat. App. No. 60/160,973, filed November 22, 1999, previously incorporated by reference. No new matter is submitted herewith.

FIG. 5 is a block diagram of a computer system that includes a gateway device for automatically configuring one or more computers to communicate via the gateway device with other networks or other online services, according to one embodiment of the present invention.

FIG. 6 shows a block diagram of the computer system of FIG. 5, implemented in a hotel computer system, according to one embodiment of the invention.

In the Detailed Description, please add the following paragraphs, immediately prior to the claims, after page 21, line 19 in the specification as filed.

ENABLING NETWORK GATEWAY DEVICES TO COMMUNICATE WITH MANAGEMENT SYSTEMS TO FACILITATE SUBSCRIBER MANAGEMENT

A system and method for enabling a management system to communicate with a network gateway device to automatically bill a computer operator for access to a computer network, such as a local network. The system includes a computer, and a network gateway device in communication with the computer for connecting the computer to a computer network, wherein the network gateway device maintains data representative of the computer operator's access to the computer network and wherein the network gateway device reconfigures the data. The system also includes a management system connected to said network gateway device for automatically billing the computer operator based upon usage of the computer network, wherein the management system is

configured to communicate according to at least one predetermined protocol. The network gateway device reconfigures the data to meet one of the predetermined protocols supported by the management system, and the management system receives the data reconfigured by the network gateway device and utilizes the data reconfigured by the network gateway device for automatic billing purposes. The method for enabling a management system to communicate with a network gateway device to automatically bill a customer for network access includes allowing a computer operator to access a computer network via a network gateway device, collecting data corresponding to a customer's local network access in the network gateway device, storing the data in the network gateway device, reconfiguring the data to a predetermined data format received from a management system, and transmitting the reconfigured data to the management system.

In order for a computer to function properly, the computer must be appropriately configured. Among other things, this configuration process establishes the protocol and other parameters by which the computer transmits and receives data. In one common example, a plurality of computers is networked to create a local area network (LAN). In the LAN, each computer must be appropriately configured in order to exchange data over the network. Since most networks are customized to meet a unique set of requirements, computers that are part of different networks are generally configured in different manners in order to appropriately communicate with their respective networks

While desktop computers generally remain a part of the same network for a substantial period of time, laptops or other portable computers are specifically designed to be transportable. As such, portable computers are connected to different networks at different times depending upon the location of the computer. In a common example in which the portable computer serves as an employee's desktop computer, the portable computer is configured to communicate with their employer's

network, i.e., the enterprise network. When the employee travels, however, the portable computer may be connected to different networks that communicate in different manners. In this regard, the employee may connect the portable computer to the network maintained by an airport or by a hotel in order to access the enterprise network, the internet or some other on-line service. Since these other networks are configured somewhat differently, however, the portable computer must also be reconfigured in order to properly communicate with these other networks. Typically, this configuration is performed by the user each time that the portable computer is connected to a different network. As will be apparent, this repeated reconfiguration of the portable computer is not only quite time consuming, but is also prone to errors.

As described by U.S. Pat. App. No. 08/816,174 and U.S. Prov. Pat. App. No. 60/111,497, a universal subscriber gateway has been developed by Nomadix, Inc. of Santa Monica, California. The contents of both of these applications are incorporated herein by reference. The gateway device serves as a gateway to a number of networks or other online services. For example, the gateway device can serve as a gateway to the internet, the enterprise network, or other on-line services. In addition to serving as a gateway, the gateway device automatically configures a computer to communicate with the new network in a manner that is transparent to the user. In this regard, the gateway device will download the necessary protocols and other parameters to the computer without any intervention by the operator and without loading any additional software on the computer.

Because high speed access to enterprise networks, the internet and on-line services is a desirable commodity, like long distance telephone service, costs associated with the service are typically passed on to the remote user/subscriber. Therefore, in many instances the remote user/subscriber is concerned with being able to acquire network access and service in the most cost efficient and convenient manner. In

this regard, subscriber remote service concerns parallel those concerns of customers utilizing internet service providers for conventional telephone line dial-up internet access. In both cases, computer operators typically want inexpensive, flexible and customer friendly service options. Correspondingly, the gateway device administrator desires the capability to be able to offer the user/subscriber numerous and different service and billing rate options, like those available in conventional dial-up internet access. For example, the remote user in a hotel environment may desire a subscription for only a day, or for the duration of their stay at the hotel. The user/subscriber may be charged on an hourly rate, a daily rate, a weekly rate, or at any other interval. Such flexible plans offer cost savings to consumers and are an attractive incentive to lure customers into buying access time to the enterprise network, online services or the internet.

Unlike conventional dial-up internet access, however, gateway devices permit remote users to access various computer networks and on-line services without having a prior service contract or an ongoing relationship with the service provider. Therefore, unlike conventional dial up access plans, which can bill subscribers on a set monthly schedule, gateway devices make recouping remote access charges more challenging. This is especially true for nomadic users, who may utilize a remote connection to a network only once before relocating. Once the traveler has moved onward, the network provider may have difficulty in collecting any unpaid service charges. Furthermore, billing of nomadic users is another hurdle to fast and easy access to the enterprise network, on-line services and the internet. The benefits of remote plug and play access therefore may be overshadowed by time consuming payment methods. For example, where a computer operator is required to complete an onerous billing procedure to pre-purchase local network time or to pay for the network use after each session, the computer operator may decide not to use the network.

Thus, any convenience provided by the computer network is superseded by the inconvenient billing method. Gateway device administrators also desire convenient methods in which to bill users/subscribers. Because the gateway device enables subscribers immediate plug and play connections to computer networks, such as hotel or airport networks, the computer network provider and/or service provider of the high speed network would like to quickly and immediately bill the users/subscribers. This billing should be able to easily track a user/subscriber's usage of the network so as to recoup costs for the network hardware and network connection. Furthermore, such billing should be automated such that system administrators do not need to individually bill each remote user.

Therefore, it is desirable for customers, network providers and service providers to implement automatic billing through the computer network so that users may be billed automatically. Such automatic billing of remote and nomadic users would benefit customers by facilitating fast and easy access, and also would benefit network providers who could appropriately charge customers for obtaining remote access.

The present invention relates generally to a network gateway device and, more particularly, to network gateway devices communicating with management systems, such as hotel property management systems, to facilitate subscriber management. The connection of the users to the system can be transparent for billing purposes, although the computer network may also provide services to the users through the management system.

According to one embodiment of the invention, there is provided a system for enabling a management system to communicate with a network gateway device on order to automatically bill a computer operator for access to a computer network such as a local network. The system includes a computer, and a network gateway device in communication with the computer for connecting the computer to a computer network and

for maintaining data representative of the computer operator's access to the computer network. The system also includes a management system connected to the network gateway device that is designed to automatically bill the computer operator based upon their access to the computer network. The management system is also designed to communicate with a third party device according to at least one predetermined protocol. According to the present invention, the gateway device is therefore designed to supply billing data using one of the predetermined protocols supported by the management system. As such, the management system receives the billing data supplied by the network gateway device and utilizes the data for automatic billing purposes.

Furthermore, in the system for enabling a management system to communicate with a network gateway device to automatically bill a computer operator for access to a computer network, the management system can be located within the computer network. Additionally, the system can include a translator in communication with the gateway device and management system for receiving the data supplied by the network gateway device. The translator can further reconfigure the supplied billing data received from the network gateway device, and can transmit the further reconfigured data to the management system. The data representative of the computer operator's access to the computer network can include data representative of the computer operator's location, access time, date which access was obtained, billing rate, and other pertinent information.

According to another embodiment of the invention, a method for enabling a management system to communicate with a network gateway device in order to automatically bill a customer for access to a computer network, such as a local network, is provided. The method comprises allowing a network administrator to access a computer network via a network gateway device, and collecting data corresponding to a customer's local network access in the network gateway device.

Furthermore, the method of the present invention comprises storing the data in the network gateway device, reconfiguring the data to one of the predetermined data formats which may be received by a management system, and transmitting the reconfigured data to the management system.

The ability to bill customers for service automatically and track customers without system intervention allows the local network service provisioning to be done economically and efficiently. This invention provides an incentive for hotels, airports, and other computer networks to provide network connections to users because the computer network has a captive customer base. Furthermore, automatic billing can enable usage-based billing for network access and services, which is desirable to customers. Finally, automatic billing can reduce the risk of network use by an unauthorized user.

Referring now to Figure 5, the computer system 10 that includes a gateway device 12 is depicted in block diagram form. The computer system 10 typically includes a plurality of computers 14 that access a computer network in order to gain access to networks 20 or other online services 22. For example, the computers 14 can be plugged into ports that are located in different rooms of a hotel or a multi-dwelling unit. Alternatively, the computers 14 can be plugged into ports in an airport, an arena, or the like. The gateway device 12 provides an interface between the plurality of computers 14 and the various networks 20 or other online services 22.

Most commonly, the gateway device 12 is located near the computers 14 at a relatively low position in the overall network (i.e., the gateway will be located within the hotel, multi-unit residence, airport, etc.). However, the gateway device 12 can be located at a higher position in the system by being located closer to the various networks 20 or other online services 22, if so desired. Although the gateway device 12 can be physically embodied in many different fashions, the gateway device 12

typically includes a controller and a memory device in which software is stored that defines the operational characteristics of the gateway device 12. Alternatively, the gateway device 12 can be embedded within another network device, such as an access controller 16 or a router 18. Moreover, the software that defines the functioning of the gateway device 12 can be stored on a PCMCIA card that can be inserted into a computer of the plurality of computers 14 in order to automatically reconfigure the computer to communicate with a different computer system, such as the networks 20 and online services 22.

The computer system 10 typically includes an access controller 16 positioned between the computers 14 and the gateway device 12 for multiplexing the signals received from the plurality of computers onto a link to the gateway device 12. Depending upon the medium by which the computers 14 are connected to the access controller, the access controller 16 can be configured in different manners. For example, the access controller can be a digital subscriber line access module (DSLAM) for signals transmitted via regular telephone lines, a cable head end for signals transmitted via coaxial cables, a wireless access point (WAP) for signals transmitted via a wireless network, a CMPS, a switch or the like. As also shown in Figure 5, the computer system 10 typically includes one or more routers 18 and/or servers (not shown in FIG. 5) of a plurality of computer networks 20 or other online services 22. While the computer system 10 is depicted to have a single router, the computer system 10 can have a plurality of routers, switches, bridges, or the like that are arranged in some hierarchical fashion in order to appropriately route traffic to and from the various networks 20 or other online services 22. In this regard, the gateway device 12 typically establishes a link with one or more routers. The routers, in turn, establish links with the servers of other networks or other online service providers, such as internet service providers, based upon the subscriber's selection. It will be appreciated by one of ordinary skill in the art that one or more devices illustrated in FIG. 5

may be combinable. For example, although not shown, the router 18 may be located entirely within the gateway device 12.

The gateway device 12 is specifically designed to allow computers to log onto the computer network in a manner that is transparent to the subscriber. In the typical computer network that employs dynamic host configuration protocol (DHCP) service, the DHCP server 24 will initially assign an IP address to a computer that is logging onto the computer network. Upon opening their web browser or otherwise attempting to access an on-line service, the gateway device 12 will direct the subscriber to enter their ID and password. The gateway device 12 then determines if the subscriber is entitled to access the computer system, the level of access and/or the type of services to which the subscriber is entitled according to an authentication, authorization and accounting procedure that is described by U. S. Patent Application No. 08/816,174 and U.S. Provisional Application No. 60/111,497. Assuming that the subscriber has been authenticated and has authorization, the gateway device 12 typically presents new subscribers with a home page or control panel that identifies, among other things, the online services or other computer networks that are accessible via the gateway device 12. In addition, the home page presented by the gateway device 12 can provide information regarding the current parameters or settings that will govern the access provided to the particular subscriber. As such, the operator can readily alter the parameters or other settings in order to tailor the service according to their particular application. Typically, changes in the parameters or other settings that will potentially utilize additional resources of the computer system will come at a cost, such that the gateway device 12 will charge the subscriber a higher rate for their service. For example, a subscriber may elect to increase the transfer rate at which signals are transmitted across the computer network and pay a correspondingly higher price for the expedited service.

The home page also permits the subscriber to select the computer network 20 or other online service 22 that the subscriber wishes to access. For example, the subscriber can access the enterprise network on which the computer is typically resident. Alternatively, the subscriber can access the internet or other on-line services. Once the subscriber elects to access a computer network or other online service, the gateway device 12 establishes the appropriate links via one or more routers 18 to the desired computer network or online service.

Thereafter, the subscriber can communicate freely with the desired computer network 20 or other online service 22. In order to support this communication, the gateway device 14 generally performs a packet translation function that is transparent to the subscriber. In this regard, for outbound traffic from the computer 12 to the computer network or other on-line service, the gateway device 12 changes the content of the packet, such as the source address, checksum, and application specific parameters, such that all outgoing packets will be directed back to the gateway device 12 rather than to the computer. In contrast, the inbound traffic from the computer network or other online service that arrives at the gateway device 12, which is really intended for the computer, is passed through the translation function so the packets eventually delivered to the computer appear to have been sent directly to the computer. As such, the computer will be completely unaware of the translation being performed by the gateway device. Additional information regarding the translation function is provided by U.S. Patent Application No. 08/816,714. By utilizing the gateway device 12 to communicate with the computer network or other online service, however, the subscriber will never have had to configure their computer 12 since the gateway device automatically adopts the computer in a manner that is transparent to the subscriber.

FIG. 6 shows a block diagram of the computer system 10 of FIG. 5, implemented in a hotel computer system 50, according to one embodiment of the present invention. It will be appreciated by those of

skill in the art that the embodiment shown in FIG. 6 is for illustrative purposes, and that the computer system 10 may be implemented with respect to computer networks established in airports, arenas, apartment complexes, office buildings or the like. The hotel computer system 50 is essentially identical to the computer system 10 shown in FIG. 6, except that the gateway device 12 is also connected to a property management system 56. The gateway device 12 may be connected to the property management system 56 through a translator 53, which is illustrated with phantom lines because the translator 53 is an optional component in the hotel computer system 50, as will be explained in detail below. Because the hotel computer system 50 comprises similar components to the system illustrated in FIG. 5, it will be appreciated that the systems can be implemented in like manners with like components. Furthermore, additional embodiments of the present invention discussed with respect to FIG. 5 may be implemented in the system 50 shown in FIG. 6.

As shown in FIG. 6, each of the plurality of computers 14 is located in a different hotel room 60, 70, 80 and 90 to allow multiple guests to access the hotel's computer network. The computers 14 are connected to the access controller 16 through a communications port in each room using a communications device such as a DSL modem, an ethernet card, a coaxial cable, or another well known communication device. Most preferably, the connection between the computers 14 and the access controller 16 is a high speed connection, so that the computers 14 can receive data as fast as the gateway device 12 can forward the data. The data transmitted from the gateway device 12 to the computers may originate from any devices located within the computer network or any devices in communication with the computer network, such as the internet. As with any multiple link communication system, the rate at which data is received by the computers 14 will be no higher than the slowest baud rate over any link in the system.

The gateway device 50 is in direct communication with the management system 56. Management systems may include any well known computer based systems implemented in hotels, airports, arenas or other venues to manage operations. In the embodiment of FIG. 6, the management system is a property management system located within a hotel. Typical hotel property management systems automate operations such as room reservations, room assignments, guest check-in and check-out, and other front desk activities. Furthermore, typical hotel property management systems can maintain a log of telephone calls and telephone charges for each guest room, and can be in communication with the internet to facilitate on-line reservations. Such management systems are typically implemented through the use of one or more conventional computers that are interconnected to form a network. The management system 56 shown in FIG. 6 is illustrative of one such system. As will be appreciated by those of skill in the art, the management system can be located within, and in direct communication with, the computer network.

In the embodiment of FIG. 6, the gateway device 50 is in communication with the property management system 56 such that each user/subscriber's access and connection to the hotel network via the gateway device 12 can be easily monitored by the property management system 56. Preferably, the gateway device 12 is connected to the property management system 56 through a serial port interface. The connection may operate at a variety of baud rates, although 2400 or 9600 bits per second are typical. The main purpose for the connection is to allow the hotel to bill each specific user/subscriber for their use and connection to the hotel's network, and to automatically bill such use directly to the room from which access was obtained. The property management system 56 can monitor and record information such as the identity of the user, the room from which the user obtained access, the amount of time that the user utilized the network, the cost of each network access, the time, date

and duration of the network access, and other additional information. As a result, the present invention offers user/subscribers of a computer network convenient payment plans in which a user does not have to pre-pay for network access or physically pay each time the network is accessed.

As will be appreciated by those of skill in the art, the information passed from the gateway device 12 can be, in most respects, identical to information received by the property management system 56 from a private branch telephone system (PBX), which are commonly utilized in hotels. PBX systems allow room to room, local and long distance telephone calls to be made by guests, and are typically connected to hotel property management systems to facilitate billing of hotel guests based upon the room in which the call is made. Charges for such use can then be paid by the guest upon checkout, automatically billed to the guest's credit card or automatically billed to the guest with room charges.

As can be appreciated with reference to FIG. 6, the property management system 56 can be in communication with additional devices other than the computer gateway system 10 of the present invention. As noted above, the property management system 56 can be directly connected to a PBX, which is, in turn, connected to each telephone located in every hotel room. Additionally, although not illustrated, the property management system 56 can be connected to additional third party components, such as pay per view television, credit card authorization systems and point of sale systems. These connections may be through serial ports, modem communications, or through other well known communication means. Such connections allow the management system to function as a fully integrated system, which allows customers to use a variety of hotel resources, while transparently being billed for each transaction.

Through the property management systems, a user/subscriber's account may be billed directly to that user's hotel bill. For example, where the management system receives data representing a computer

operator's access to the local system, the management system can automatically bill the operator through the use of a credit card authorization system in communication with the property management system. In this manner, the customer's payment can be fast, easy, automated and transparent to the user.

Traditional hotel property management systems are configured to communicate with various third party systems, such as point of sale systems, PBX systems, pay per view systems, and credit card authorization servers, as noted above. Hotel property management systems are generally configured to receive such communications because these third party systems are typically used in the vast majority of hotels. To receive data from each of these third party systems, management systems typically include software for communicating with the third party systems based upon the data protocol and data structure implemented by the management system. The software allows data from third party systems to be received and reconfigured, if necessary, so that the data is in a format appropriate to be utilized by the management system 56. However, because typical management systems that are currently deployed are not designed to receive data from a gateway device 12, the gateway device 12 is preferably designed to interface with the management system 56 without requiring additional programming of the management system software.

The gateway device 12 of the present invention formats data such that the data has the same data protocol and data structure as that of a third party service, such as a PBX, that the management system 56 is already designed to receive. The management system 56 is adapted to communicate using different protocols, through technology known as COM objects. Thus, the gateway device 12 can masquerade as a PBX or another third party system. The gateway device 12 receives a data record corresponding to an individual user/subscriber's use of the computer system, including the user/subscriber's location (room number), access

time, and additional information, as discussed above. The gateway device 12 stores this information and modifies the data record to fit the proper format required by the property management system vendor. Although the format of the data is changed, no data is changed in the modification. The reconfigured data is then transmitted to the management system 56. This data can be in a call accounting record (CAR) and low level protocol (LLC) format, data formats typical of third party systems such as PBXs. Such formats are well known to those of skill in the art of property management system design.

Because management systems can differ, each system utilizing different user interfaces, variables, and operating systems, the gateway device should communicate data to the property management system 56 using data formats acceptable to a large number of management systems. In this manner, the gateway device 12 may be compatible with a majority of property management systems. For example, the gateway device 12 may be preconfigured to operate with the most popular management systems and formats, such as Micros Fidelio (manufactured by MICROS Systems, Inc., Beltsville, MD), HOBIC, AutoClerk (manufactured by AutoClerk, Inc., Lafayette, California), and other well known systems and formats.

However, there are many different management system standards, none of which are universal and implemented in all property management systems. As a result, although the gateway device 12 can configure data to conform to a large number of differing management systems, the gateway device 12 may not be able to conform to some systems. As a result, a translator 53 may be optionally used to manipulate the data output by the gateway device 12 in such a manner as to allow the data to be utilized by the property management system 56. In one embodiment, the translator may comprise a Lodging Link II device (LL) (manufactured by Protocol Technologies, Inc., Scottsdale, Arizona) to convert incoming data from the gateway device 12 to data acceptable to the property

management system device, such as UHALL protocol. Additionally, the translator may also be connected to one or more devices or systems in communication with the property management system, such as the pay per view system or credit card authorization system, to format data output by any system or component having data protocols which differ from those of the management system 56.

Because data may be transferred to the management system in a CAR format, data typically within such format must be altered to accurately reflect the computer network service being provided to the user/subscriber. For example, in PBX systems, CAR format usually includes the phone number to which a telephone call is being made. However, when a user/subscriber is obtaining access to the hotel network via the gateway device 12, no telephone number is dialed or called. Therefore, when possible, data within the CAR format (i.e., telephone record), such as telephone numbers, may be replaced with a descriptive record that indicates some other data that the property management systems wish to track or record. On the other hand, where the CAR records cannot be replaced, a bogus field, such as a bogus telephone number, may be included so that the property management system receives the entire record it is programmed to receive. Thereafter, the bogus number is not utilized by the management system 56. Additional problems may also exist, for example, where the management system 56 is not devised to support the non-numeric ASCII characters typically transmitted by the gateway device 12. In this situation, the gateway device can be configured to replace the ASCII characters with numeral designations.

Once the data transmitted by the gateway device is received by the property management system 56, the property management system can display the data using a management system interface. Preferably, the data may be displayed in an easily readable and printable form to allow a user/subscriber to view a summary of access information. Additionally, the

data should be accessible to the user/subscriber's accounting record. In this manner, charges due to network access may be automatically placed on a customer's pre-existing bill, such as a hotel bill. Where access is obtained at another location, such as at an airport, the airport system manager (i.e., equivalent to the hotel property management system in the above example) may automatically bill the customer, can automatically charge the customer's credit card, or can add the charges to an account which the customer maintains. In this regard, while the property management system 56 has primarily been described in conjunction with a hotel computer network, the property management system can be utilized in a variety of other applications in which a user/subscriber obtains access to a computer network or other on-line service via a gateway device.